As shown in FIG. 19, the maximum selector 46 is connected to the subtracter 44, and selects a maximum peripheral block temperature difference estimated value Tb out of the peripheral block temperature difference estimated values Tbd for the peripheral blocks in one field, that is, one display screen which are outputted from the subtracter 44 and extracts the maximum peripheral block temperature difference estimated value Tbd as a maximum peripheral block temperature difference estimated value Tmax.

FIG. 20 is a diagram showing an example of a temperature estimated value Tb, a peripheral block temperature difference estimated value Tbd, and a maximum peripheral block temperature difference estimated value Tmax which are estimated for each peripheral block.

As shown in FIG. 20(*a*), it is assumed that a temperature estimated value Tb is estimated for each peripheral block, as in FIG. 15(*a*). As shown in FIG. 20(*b*), a peripheral block temperature difference estimated value Tbd for each peripheral block is then found, as in FIG. 15(*b*). Finally, a peripheral block at the lower left corner having a maximum peripheral block temperature difference estimated value Tbd (13 in the example shown in FIG. 20) out of peripheral block temperature difference estimated values Tbd shown in FIG. 20(*b*) is selected, and 13 which is the peripheral block temperature difference estimated value Tbd for the peripheral block is taken as the maximum peripheral block temperature difference estimated value Tmax.

As a result, as shown in FIG. 20(C), the peripheral block temperature difference estimated values Tbd for all the peripheral blocks are replaced with the maximum peripheral block temperature difference estimated value Tmax. A multiplication factor k is determined, as in FIG. 8, for each peripheral block using the maximum peripheral block temperature difference estimated value Tmax, and the luminance of each of the peripheral blocks is controlled depending on the multiplication factor k.

A controller 3 uses the maximum peripheral block temperature difference estimated value Tmax found in the above-mentioned manner, to output a brightness control signal LC to a brightness controller 2 such that the luminance is controlled for each peripheral block. The brightness controller 2 outputs to a display 1 an address driver driving control signal AD, a scan driver driving control signal CS, and a sustain driver driving control signal US for controlling luminance for each peripheral block depending on the brightness control signal LC. In the display 1, the luminance is controlled in response to each of the inputted driving control signals.

The present embodiment is the same as the second embodiment except that a temperature difference estimator 4B corresponds to a temperature estimation circuit and an operation circuit.

In the plasma display device configured as described above, the luminance control method for each of the above-mentioned embodiments can be used, thereby making it possible to obtain the same effect.

In the present embodiment, the luminance is controlled using the maximum peripheral block temperature difference estimated value Tmax representing the largest temperature difference in the peripheral blocks, thereby making it possible to more reliably prevent the PDP 11 from being damaged. Further, the luminance is controlled by one maximum peripheral block temperature difference estimated value, so that processing for controlling the luminance is simplified.

Description is now made of a plasma display device according to a fourth embodiment of the present invention. FIG. 21 is a block diagram showing the configuration of the plasma display device according to the fourth embodiment of the present invention.

The plasma display device shown in FIG. 21 is the same as the plasma display device shown in FIG. 1 except that a temperature measuring unit 6 is added. Accordingly, the same portions are assigned the same reference numerals and hence, the description thereof is not repeated.

As shown in FIG. 21, the temperature measuring unit 6 is connected to a panel periphery temperature setter 5, and directly measures the temperature of the panel outer periphery of a PDP 11 and outputs the measured temperature to the panel periphery temperature setter 5. The panel periphery temperature setter 5 sets a reference value To corresponding to the measured temperature and outputs the set reference value To to a temperature difference estimator 4. After that, the subsequent processing is performed, as in the first embodiment, so that luminance is controlled.

The present embodiment is the same as the first embodiment except that the panel periphery temperature setter 5 and the temperature measuring unit 6 correspond to a measurement circuit.

In the plasma display device configured as described above, the luminance control method in the first embodiment can be similarly used, thereby making it possible to obtain the same effect. When the temperature measuring unit 6 in the present embodiment is used for another embodiment, a luminance control method in another embodiment can be also similarly used, thereby making it possible to obtain the same effect.

In the present embodiment, the temperature of the panel outer periphery is directly measured, and the luminance can be controlled on the basis of the reference value To corresponding to the temperature. Even when the reference value To is changed due to the variation in outer air temperature, for example, therefore, the PDP 11 can be more reliably prevented from being damaged. The number of measuring points in the temperature measuring unit 6 may be one or plural in the panel outer periphery. When a plurality of points are measured, a reference value may be set for each of the measuring points, or a reference value may be set, for example, with respect to the average of the results of the measurement of the plurality of points.

Although in each of the above-mentioned embodiments, the video signal VS is multiplexed by the multiplication factor k included in the brightness control signal LC outputted from the controller 3 in the multiplication circuit 21 to control the luminance, the maximum luminance of an image displayed on the pdp 11 may be lowered by changing the multiplication circuit 21 into a limiting circuit for limiting the maximum luminance of the video signal, outputting an upper-limit value of the maximum luminance corresponding to the temperature difference estimated value from the controller 3, and limiting only luminance exceeding the upper-limit value of the maximum luminance by the limiting circuit.

What is claimed is:

1. A display device, comprising:

a display having a display screen, that displays an image with a gray scale corresponding to a video signal using a plurality of light emitting formats which are equal in a total number of gray scales but which differ in the number of light emitting pulses on each of the gray scales, and an outer peripheral portion adjacent to said display screen;

a temperature estimation device that provides a temperature estimation value, that corresponds to a temperature of said display screen, from said video signal;

an operation device that obtains a temperature difference estimation value based upon a reference value, that corresponds to a temperature of said outer peripheral portion, and said temperature estimation value; and

a control device that selects a light emitting format, from said plurality of light emitting formats, based upon said temperature difference estimation value, to lower a luminance of said image as said temperature difference estimation value increases.

2. The display device of claim 1, wherein said temperature estimation device estimates said temperature estimation value based upon a temperature of an outer periphery adjacent portion in said display screen adjacent to said outer peripheral portion.

3. The display device of claim 1, wherein said display comprises:

a first board;

a second board; and

a plurality of light emitting elements interposed between said first board and said second board to form said display screen, an outer periphery of said first board being fixed to an outer periphery of said second board.

4. The display device of claim 3, wherein said outer periphery of said first board and said outer periphery of said second board includes a portion between said light emitting elements positioned in an outermost periphery of said plurality of light emitting elements and a fixed portion of said first board and said second board.

5. The display device of claim 1, wherein said temperature estimation device estimates said temperature estimation value by integrating data related to said luminance from said video signal, and subtracting data corresponding to an amount of dissipated heat from said integrated data, said operation device obtaining said temperature difference estimation value by subtracting said reference value from said temperature estimation value.

6. The display device of claim 1, wherein said gray scale of said displayed image is selected from among a plurality of gray scales, said control device lowering said luminance of said image at a same ratio for each of said plurality of gray scales.

7. The display device of claim 6, wherein said reference value is selected from a plurality of reference values that differ depending on a position of said outer peripheral portion of said display.

8. The display device of claim 1, further comprising:

a measurement device that measures said temperature of said outer peripheral portion of said display, said measurement device outputting said reference value, corresponding to said measured temperature, to said operation device.

9. A method for controlling a luminance of a display having a display screen, that displays an image with a luminance corresponding to a video signal, and an outer peripheral portion adjacent to said display screen, comprising:

estimating a temperature estimation value, corresponding to a temperature of the display screen, from the video signal;

determining a temperature difference estimation value using a reference value corresponding to the temperature of the outer peripheral portion and the temperature estimation value;

selecting a light emitting format, from among a plurality of light emitting formats, based upon the temperature difference estimation value; and

lowering the luminance of the image as the temperature difference estimation value increases.

10. A display device, comprising:

a display having a display screen, that displays an image with a gray scale corresponding to a video signal using a plurality of light emitting formats which are equal in a total number of gray scales but which differ in the number of light emitting pulses on each of the gray scales, and an outer peripheral portion adjacent to said display screen;

a temperature estimation device that provides a temperature estimation value, that corresponds to a temperature of said display screen, from said video signal;

an operation device that obtains a temperature difference estimation value based upon a reference value, that corresponds to a temperature of said outer peripheral portion, and said temperature estimation value; and

a control device that controls that luminance of the image based on the temperature difference estimation value.